



U.S. National Library of Medicine®

Environmental Health Information Partnership

Data for Use in Decision-Making in Science, Health, and Community Engagement

Proceedings

March 28-29, 2018



**NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE**

**ENVIRONMENTAL HEALTH
INFORMATION PARTNERSHIP**

PROCEEDINGS

Nashville, Tennessee

March 28–29, 2018

*Data for Use in Decision Making
in Science, Health, and Community Engagement*

Prepared for
Division of Specialized Information Services
National Library of Medicine

Prepared by
Health, Energy, and Environment
Oak Ridge Associated Universities

This document was prepared for the **Division of Specialized Information Services, National Library of Medicine,**
National Institutes of Health by the Oak Ridge Associated Universities (ORAU)

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History of Meharry Medical College

When Meharry Medical College was originally established in 1876, its mission was to teach former slaves in the healing arts. In the years since, Meharry has grown into the nation's largest private, historically black academic health science center. It has educated more than 11,000 health professionals, which includes 7,000 medical and dental alumni that are currently practicing throughout the United States.

Meharry Medical College comprises three schools: the School of Medicine, the School of Dentistry, and the School of Graduate Studies and Research, with a combined annual enrollment of about 830 students. As a health sciences professional institution, Meharry offers eight degree programs: MD, MD/PhD, MD/MSPH, DDS, DDS/PhD, PhD, MSPH, and MHS.

SCHOOL OF MEDICINE—A top producer of primary care physicians; ranked second among 141 academic health science centers by a study published in the *Annals of Internal Medicine*. This school was founded in 1876 by Samuel Meharry and his four brothers.

SCHOOL OF DENTISTRY—Leading producer of African-American dentists; 44% of all black dentists in the United States were trained at Meharry Medical College. Founded in 1886 by Dr. George Whipple Hubbard, the Meharry School of Dentistry is one of only two dental schools in Tennessee and is the only dental school in Nashville.

SCHOOL OF GRADUATE STUDIES & RESEARCH—Consistently earns recognition as a top producer of African-American biomedical PhD graduates, especially for producing the highest percentage of African-American males graduating with PhDs in the biomedical sciences. This school was founded in 1938.

As a private college, Meharry has faith-based ties to the United Methodist Church. The college motto is "Worship of God Through Service to Mankind." In keeping with this motto, Meharry has provided \$29 million annually in uncompensated medical and dental care to the uninsured and indigent in Davidson County. Four of every five (83%) medical and dental alumni serve in underserved rural and urban communities.

Accreditations have been bestowed onto the school by Southern Association of Colleges and Schools Commission on Colleges, Liaison Committee on Medical Education, Commission on Dental Accreditation, and Council on Education for Public Health.



**NATIONAL LIBRARY OF MEDICINE®
ENVIRONMENTAL HEALTH INFORMATION PARTNERSHIP MEETING**

Theme: Data for Use in Decision Making in Science, Health and Community Engagement

**Cal Turner Family Center for Student Education
Executive Board Room
March 28–9, 2016
Patricia Matthews-Juarez, PhD, Presiding**

AGENDA

WEDNESDAY, MARCH 28, 2018 (Central Time)

8:30 a.m. – 8:45 a.m.	Registration
8:25 a.m. – 8:30 a.m.	Meeting Opening and Welcome Patricia Matthews-Juarez, PhD, Chairman, EnHIP Vice President of Faculty Affairs and Development Professor, Department of Family and Community Medicine Meharry Medical College Rueben C. Warren, DDS, MPH, DrPH, MDiv Senior Scientific Advisor Professor & Director, National Center for Bioethics in Research and Health Care Tuskegee University
8:30 a.m. – 9:00 a.m.	Report from NLM Director (via video) Patricia Flatley Brennan, RN, PhD Director, National Library of Medicine
9:00 a.m. – 9:30 a.m.	Meharry Group Welcomes EnHIP James E.K. Hildreth, PhD, MD President Meharry Medical College Veronica Mallett, MD, MMM Dean for the School of Medicine & Senior Vice President for Health Affairs Meharry Medical College

Brenda Green, MLS, FMLA
Associate Vice President, Institutional Technology
Library Director, Meharry Medical College

Shawn Bakker, MTS
President
Nashville Public Library Foundation

9:30 a.m. – 10:00 a.m.

Introductions

10:00 a.m. – 10:20 a.m.

Precision Medicine and Its Potential Impact in Communities

Robert Carroll, PhD
Research Assistant Professor of Biomedical Informatics
Vanderbilt University

10:20 a.m. – 10:30 a.m.

Discussion and Q&A

10:30 a.m. – 10:40 a.m.

BREAK

10:40 a.m. – 10:50 a.m.

Public Health Exposome: Measuring the Impact of Environment on Health over the Life Course

Paul Juarez, PhD
Professor, Department of Family and Community Medicine
Executive Director, Health Disparities Research Center of Excellence
Meharry Medical College

10:50 a.m. – 11:00 a.m.

Discussion and Q&A

Facilitated by Daniel Sarpong, PhD
Endowed Chair & Director
Center for Minority Health & Health Disparities Research and Education
Xavier University of Louisiana

11:00 a.m. – 11:45 a.m.

Impact of Environmental Toxins and Population Health

Darryl Hood, PhD
Associate Professor
College of Public Health/Environmental Health Sciences
The Ohio State University

11:45 a.m. – 11:55 a.m.

Discussion and Q&A

Facilitated by Patricia Matthews-Juarez, PhD

12:00 p.m. – 1:15 p.m.

LUNCH

1:15 p.m. – 2:00 p.m.	Citizen Science: Impact on Data-Driven Decision Making Wansoo Im, PhD Associate Professor Director, National Community Mapping Institute Meharry Medical College Engaging Communities through Data Sharing and Social Media Katherine Brown, EdD, OTR/L Director, Communities of Practice National Center for Medical Education, Development & Research Meharry Medical College
2:00 p.m. – 2:15 p.m.	BREAK
2:15 p.m. – 2:30 p.m.	The Role of Librarians in Data Science and Management Brenda Green, MLS, FMLA Associate Vice President Institutional Technology Library Director, Meharry Medical College
2:30 p.m. – 3:00 p.m.	EnHIP Group Picture Photographer, Meharry Medical College Cal Turner Family Center for Student Education
3:00 p.m. – 3:30 p.m.	Networking around questions of Data/Precision Medicine, Health Disparities/Use for Research, Education, and Clinical Services EnHIP Representatives Rueben C. Warren, DDS, MPH, DrPh, MDiv Senior Scientific Advisor Professor & Director, National Center for Bioethics in Research and Health Care Tuskegee University
3:30 p.m. – 3:40 p.m.	Report from EnHIP Chairman Patricia Matthews-Juarez, PhD Chairman, EnHIP
3:40 p.m. – 4:00 p.m.	Wrap-up and Day 2 Overview Patricia Matthews-Juarez, PhD Chairman, EnHIP

**NATIONAL LIBRARY OF MEDICINE
ENVIRONMENTAL HEALTH INFORMATION PARTNERSHIP MEETING
Cal Turner Family Center for Student Education**

AGENDA

THURSDAY, MARCH 29, 2018 (Central Time)

8:30 a.m. – 8:45 a.m.	Registration
8:45 a.m. – 9:00 a.m.	Welcome and Introductions Patricia Matthews-Juarez, PhD Chairman, EnHIP
9:00 a.m. – 9:20 a.m.	Understanding Opioid Communication Needs through Qualitative Research with Subject Matter and Community Expert Jennifer Reynolds, MPH, CHES Health Education Specialist Project Manager Oak Ridge Associated Universities
9:20 a.m. – 9:30 a.m.	Discussion and Q&A
9:30 a.m. – 10:00 a.m.	Overview Tribal Epidemiology Center Pamela Staples, MS Public Health Program Manager United South and Eastern Tribes, Inc.
10:00 a.m. – 10:15 a.m.	BREAK
10:15 a.m. – 10:30 a.m.	Honoraria & Travel Reimbursement LaFrancis Gibson, MPH, CHES Health Education Specialist Section Manager Oak Ridge Associated Universities
10:30 a.m. – 11:30 a.m.	NLM Strategic Plan Introduction and Discussion led by Janice Kelly, MLS Division of Specialized Information Services (SIS), NLM Outreach and Special Populations Branch
11:35 a.m.	Closing Remarks Patricia Matthews-Juarez, PhD Chairman, EnHIP

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE®**

**PROCEEDINGS OF THE ENVIRONMENTAL HEALTH
INFORMATION PARTNERSHIP (EnHIP) MEETING
March 28–29, 2018**

The Environmental Health Information Partnership (EnHIP) convened its annual meeting on March 28, 2018, at 8:25 a.m. and on March 29, 2018, in the Cal Turner Family Center for Student Education at Meharry Medical College, Nashville, Tennessee. The theme of the meeting was “Data for Use in Decision Making in Science, Health, and Community Engagement.” EnHIP Chair Dr. Patricia Matthews-Juarez, Professor, Department of Family and Community Medicine and Vice President for Faculty Affairs and Development, Meharry Medical College, presided.

The annual EnHIP meeting adjourned at 11:45 a.m. on March 29, 2018.

ATTENDEES

Representatives from Participating Institutions

Dr. Candyce Berger, The University of Texas at El Paso
Ms. Dolores E. Caffey-Fleming, Charles R. Drew University of Medicine and Science
Mr. Steven Chischilly, Navajo Technical University
Dr. Robert L. Copeland, Jr., Howard University
Dr. Sandra Harris-Hooker, Morehouse School of Medicine
Dr. Diógenes Herreño-Sáenz, University of Puerto Rico
Dr. Jannett Lewis-Clark, Tuskegee University
Mr. Phillip C. Marshall, Haskell Indian Nations University
Dr. Patricia Matthews-Juarez, Meharry Medical College
Dr. Arlene Montgomery, Hampton University
Dr. Milton A. Morris, Benedict College
Dr. Daniel Sarpong, Xavier University of Louisiana
Dr. Cheryl Taylor, Southern University, Baton Rouge
Dr. Paul B. Tchounwou, Jackson State University
Dr. Robert Valdez, University of New Mexico
Dr. Doris Withers, Medgar Evers College, CUNY
Ms. Jessica Zephier, Oglala Lakota College

Alternate Representatives

Dr. Stephanie Bauer, University of Alaska Anchorage
Dr. Betty Damask Bembek, Colorado Mountain College
Dr. Syreeta Tilghman, Florida A&M University
Dr. Zivar Yousefipour, Texas Southern University

NLM Consultant

Mr. John C. Scott, Center for Public Service Communications

Senior Scientific Advisor

Dr. Rueben C. Warren, Tuskegee University

Speakers

Ms. Shawn Bakker, Nashville Public Library Foundation
Dr. Patricia F. Brennan, Director, NLM
Dr. Katherine Brown, Meharry Medical College
Dr. Robert Carroll, Vanderbilt University
Ms. Brenda Green, Meharry Medical College
Dr. James E.K. Hildreth, President, Meharry Medical College
Dr. Darryl Hood, The Ohio State University
Dr. Wansoo Im, Meharry Medical College
Dr. Paul Juarez, Meharry Medical College
Dr. Veronica Mallett, Meharry Medical College
Ms. Jennifer Reynolds, Oak Ridge Associated Universities
Ms. Pamela Staples, United South and Eastern Tribes, Inc.

Guests

Dr. João Ferreira-Pinto, The University of Texas at El Paso
Mr. Michael Paul, Meharry Medical College
Dr. Aramandla Ramesh, Meharry Medical College
Ms. Vanessa Smith, Meharry Medical College
Ms. Julia Watson, Meharry Medical College

NLM Staff

Ms. Shannon Jordan, Division of Specialized Information Services, NLM
Ms. Janice E. Kelly, Division of Specialized Information Services, NLM

ORAU Staff

Ms. Kelli Bursey, Oak Ridge Associated Universities
Ms. LaFrancis Gibson, Oak Ridge Associated Universities
Dr. Denise Parker, Oak Ridge Associated Universities

Day 1

I. Meeting Opening and Welcome

Dr. Patricia Matthews-Juarez, EnHIP Chair, called the meeting to order at 8:25 a.m. on March 28, 2018. She welcomed attendees and introduced the theme for the annual meeting: “Data for Use in Decision Making in Science, Health, and Community Engagement.” As a part of her opening remarks, she emphasized the need to develop reliable, trustworthy data readily accessible and usable for everybody—from researchers and health professionals to community-based stakeholders as well as the public at large. She encouraged EnHIP members to explore and discuss avenues to discover, access, and retrieve biomedical and health information and enhance dissemination in their communities.

Dr. Rueben C. Warren, EnHIP Senior Scientific Advisor, Professor and Director of the National Center for Bioethics in Research and Health Care at Tuskegee University, briefly remarked that EnHIP members have an opportunity to contribute to environmental health and social justice. He underlined the importance of asking not only “what do the data say” but also “what do the data mean.”

II. Report from NLM Director

Dr. Patricia Flatley Brennan, Director, National Library of Medicine® (NLM), joined the EnHIP meeting by video and expressed appreciation for EnHIP efforts over the past 25 years in bringing to NLM an understanding of their communities’ information needs.

She started her presentation with an overview of NLM history. The library began in 1836 as a small assortment of books and journals under the care of the U.S. Army Surgeon General. As the collection expanded, it was moved several times before relocating in 1962 to a secure, bomb-proof building—a testament to the national value of the library—on the Bethesda, Maryland, campus of the National Institutes of Health (NIH). NLM is one of 27 institutes and centers of NIH.

Dr. Brennan stated that NLM is responsible for leading the United States and world in health information sciences, health informatics, and, increasingly, data sciences. The library provides access to more than 28 million citations in PubMed Central; provides access to research data housed at NLM, mostly genome sequences; and serves as a nexus for clinical data standards, literature standards, and research data standards that help ensure consistent usage of terms.

Given an increasing national focus on data-driven health and research, Dr. Brennan noted that standards are the key to making certain that data is findable, accessible, interoperable, and reusable—the FAIR Data Principles. Embedded in these principles are the challenges of protecting data to respect personal privacy, making sure that data are attributable (i.e., credited to the individual[s] who created the data set), and ensuring that data will be available in perpetuity.

Dr. Brennan explained how NLM sees these developments in the broader context of “new changes in science”—the idea that science should be open and accessible to the public and that discovery should be driven not only by new experiments but also by reusing existing data. In this new perspective on science, individuals should be sharing research data as well as the analytical and visualization tools they use, so that data collected once can be leveraged and used many times. Dr. Brennan sees NLM playing a lead role in facilitating this transformation: “We are seeing a shift in the model of research activities, we are seeing a shift in what constitutes important scientific communication, and the National Library of Medicine needs to be front and center as the shift occurs.”

To meet that objective, the NLM Strategic Plan 2017–2027 was developed with input from a wide range of stakeholders. The plan directly supports the NIH objectives to advance opportunities for biomedical research, foster innovation, enhance scientific stewardship, and manage for results. While NLM remains true to its core mission of promoting the library, ensuring outreach to communities, and conducting research in biomedical informatics and data sciences, the NLM strategic vision outlines three new areas that fundamentally accelerate biomedical discovery and data-powered health and ensure the health of the public.

Dr. Brennan introduced the strategic plan's three goals and elaborated on the objectives supporting those goals. First, NLM will accelerate discovery and advance health by providing the tools for data-driven research. This represents a shift from managing literature to managing a wide range of data, ensuring it will be available to investigators. NLM will link data, analytic pipelines, literature, and visualization tools into a single, seamless, accessible, and traceable system. They will develop new algorithms and methodologies to curate data from a variety of sources and make data easy to access through cloud storage, while protecting the personal rights of individuals who contributed the data. NLM will foster open science policies and practices to make literature and data widely discoverable and accessible.

Second, NLM will strive to reach more people in more ways through enhanced dissemination and engagement pathways. Dr. Brennan felt that this focus would be of particular interest to EnHIP. NLM seeks to know users and establish trusting relationships, and she commented that “the imprimatur of the National Library of Medicine lets the user know that this data has been properly treated, rights have been protected, and curation and metadata have been applied in a systematic way.” NLM will explore new platforms for delivering resources to users and is committed to reducing health disparities through facilitating information access.

The third goal is to build a workforce for data-driven research and health by cultivating data-savvy users, scientists, and librarians. NLM will expand research training for predoctoral and postdoctoral fellows in biomedical informatics and data science and will work in partnership with other agencies, universities, and online education providers to increase training and improve data science and open science proficiency. Dr. Brennan said NLM has two key strategies for increasing workforce diversity: (1) teaching K–12 students from underrepresented groups that “technology and health care can go together,” and (2) enhancing the career trajectory of young scientists from underrepresented groups by adequate funding early in their careers to reduce dropout rates. Finally, Dr. Brennan shared her personal observation that the younger generations preferentially communicate through new technologies (texting, social media, etc.), and we need to figure out how to use these technologies to help young people become data literate.

Dr. Brennan concluded her presentation with a short video that portrayed the NLM vision of data-powered health in the everyday moment. She thanked EnHIP for their contributions to NLM and asked for representatives' thoughts on how NLM can partner with EnHIP and the communities they represent to realize the strategic plan.

III. Discussion and Q&A with Dr. Patricia Flatley Brennan

Dr. Cheryl Taylor, Southern University, Baton Rouge, asked Dr. Brennan what the EnHIP representatives could do to assist the NLM effort in preparing the workforce for health care and data science roles. Dr. Brennan suggested that representatives check the NIH Web site to see if their institutions are located in one of the 23 states and territories eligible for Institutional Development Award (IDeA) funding¹. This program targets states that have historically been underserved by NIH and provides grants to build research capacity, faculty development, and infrastructure improvements. Dr. Brennan said that data science training will include three components: developing data scientists (mathematicians and computer scientists), biomedical scientists (“problem-inspired” data scientists), and library scientists. Biomedical scientists are the most likely to receive IDeA funding, but Dr. Brennan also stressed that library science career opportunities are growing. She encouraged EnHIP members to foster not only the computational parts of data science but also the curation part with their students. Finally, Dr. Brennan recommended that outreach activities include efforts to increase awareness among children and their parents of what data mean in their lives.

Dr. Daniel Sarpong, Xavier University of Louisiana, mentioned that, when mining data, researchers must be aware of psychosocial and contextual factors associated with the data. Computations may be right, but interpretation may be off if the dynamics of the studied population are not considered. Dr. Sarpong asked what NLM is doing to capture context. Dr. Brennan responded that data-driven investigations are more likely to consider context than traditional experimental approaches because many more variables can be included. Data-driven research allows us to understand “context at many scales,” from genes to environment to social conditions. Through data science, we are learning how to integrate data (e.g., biological, behavioral, social) into a composite package to better understand health.

Dr. Darryl Hood, The Ohio State University, asked Dr. Brennan if she expected NLM to become the data warehouse for NIH. She replied, “yes and no,” and proceeded to explain that NLM resources would be invested in data sets requiring high levels of curation, thus providing added value. [Video transmission failed at this point, and Dr. Brennan was unable to finish the question-and-answer session.]

Dr. Robert Valdez, University of New Mexico, commented that the audio failure highlighted a concern about access to high-speed Internet. The discussion about data-driven research presumes that the communities that EnHIP serves have high-speed Internet. Dr. Valdez asked whether NLM will work with other government entities (such as the Department of Agriculture and the Department of Housing and Urban Development, who have grants to install high-speed Internet in underserved communities) to make access to high-speed Internet a reality. Dr. Candyce Berger, The University of Texas at El Paso, voiced a similar concern. She said telemedicine training of practitioners in isolated communities has been problematic for the same reason.

Dr. Matthews-Juarez concluded the discussion by asking participants to submit written questions that she would pass on to Dr. Brennan.

¹ <https://www.nigms.nih.gov/Research/DRCB/IDeA/Pages/default.aspx>

The states and territories eligible for IDeA funding are Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Puerto Rico, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia, and Wyoming.

IV. Meharry Leadership and the Nashville Public Library Foundation Welcome EnHIP

Dr. Matthews-Juarez introduced the president of Meharry Medical College, Dr. James E.K. Hildreth. His work in HIV/AIDS has earned numerous awards and has contributed significantly to the HIV/AIDS data reservoir. Dr. Hildreth remarked that the EnHIP mission² aligns with Meharry's mission³, which has gained momentum with the opening of a new data science center on campus. He commended NLM for its role as a trusted partner and congratulated Dr. Brennan for her outstanding achievement in completing the NLM Strategic Plan 2017–2027. He also applauded EnHIP for the work they have done to make data available and impactful for their communities and noted that “data is just data—it is not information, and information is not knowledge, but it is the starting point for knowledge, and that is why EnHIP's work is so important.”

Dr. Matthews-Juarez then introduced Dr. Veronica Mallett, Dean and Senior Vice President for Health Affairs at Meharry Medical College. Dr. Mallett explained how “big data” has created an opportunity to revolutionize health care. She described a scenario where a patient's wearable device provides the treating clinician with a wealth of data, from vital signs and a genetic profile to social determinants of health. With that information, the clinician can formulate a highly personalized treatment plan at considerable cost savings relative to a traditional patient/clinician visit. Under Dr. Mallett's leadership, Meharry recently launched a curriculum to prepare students for this new vision of health care delivery, with data science interwoven throughout the curriculum. Dr. Mallett concluded by saying that Meharry's partnerships with NLM and EnHIP will help Meharry capitalize on the use of data science and reduce health disparities and achieve health equity.

Ms. Brenda Green, Library Director and Associate Vice President for Institutional Technology, Meharry Medical College, briefly addressed the EnHIP gathering and noted that NLM has designated Meharry's library as a resource library to help fulfill the NLM mission within the National Network of Libraries of Medicine (NNLM) Southeastern/Atlantic Region. As a resource library, Meharry's collection is accessed by other libraries nationwide. Ms. Green mentioned several of the NLM free-access databases and encouraged data users to take advantage of librarians' expertise in discovering and learning how to use these resources. She encouraged meeting participants to stop by the Meharry Medical College Library.

Ms. Shawn Bakker, President of the Nashville Public Library (NPL) Foundation, welcomed the meeting participants to Nashville. The NPL Foundation's mission is to raise private support for the library, which was named 2017 Library of the Year by Library Journal magazine. Ms. Bakker's presentation centered on the library's “Be Well at NPL” and STEAM (science, technology, engineering, art, and mathematics) programs to improve health literacy and digital literacy, respectively, in the greater Nashville area. The library sponsors yoga, meditation, and exercise classes as a venue to share health information, and hosts “STEAM labs,” encouraging young people to explore career opportunities in science, technology, engineering, art, and mathematics. NPL also offers programs to help seniors access health information via the Internet and is partnering with the National Public Education Foundation to improve reading skills in Nashville's public elementary schools. Ms. Bakker noted the need to partner with other entities and concluded her talk with an invitation to visit the Nashville Public Library.

² The mission of EnHIP is to enhance the capacity of minority-serving academic institutions to reduce health disparities through the access, use, and delivery of environmental health information on their campuses and in their communities.

³ Meharry Medical College is an academic health sciences center that exists to improve the health and health care of minority and underserved communities by offering excellent education and training programs in the health sciences.

V. Discussion and Q&A with Meharry Leadership

Dr. Taylor asked Dr. Mallett how minority-serving educational institutions can maintain their legacy of mentoring students while still moving forward with the data-driven approach to learning. Dr. Mallett explained that at Meharry, mentoring and the data-driven approach go hand-in-hand. Students gain competency in subject matter through technology and data but also have small-group learning opportunities and weekly formative assessments to ensure academic success. Dr. Matthews-Juarez encouraged EnHIP representatives interested in learning more about Meharry’s curriculum initiative to pursue further discussion with Dr. Mallett.

VI. Introductions

Dr. Matthews-Juarez asked attendees to introduce themselves. Everyone stated their names, affiliations, and professional positions. Mr. John C. Scott, Center for Public Service Communications, informed the group that he is retiring after serving as EnHIP consultant for 21 years. Dr. João Ferreira-Pinto, The University of Texas at El Paso, also said this would be his last meeting. He will be replaced by Dr. Berger, who was in attendance this year.

VII. Precision Medicine and Its Potential Impact in Communities

Dr. Matthews-Juarez introduced Dr. Robert Carroll, Research Assistant Professor of Biomedical Informatics at Vanderbilt University, and provided a brief background on the NIH Precision Medicine Initiative®. This initiative seeks to accelerate biomedical discoveries through advances in health information technology and genomics, coupled with new methods for curating and analyzing large volumes of data. One major part of the Precision Medicine Initiative is the All of UsSM Research Program, which is enrolling one million volunteers to share personal and medical data. The All of Us Research Program aims to assemble one of the largest and most diverse biomedical data sets available to researchers, citizen scientists, and others.

Dr. Carroll’s presentation elaborated on the All of Us Research Program, beginning with the concept of personalized medicine, which recognizes individual differences in disease risk, drug response, and treatment effectiveness. The All of Us Research Program will contribute to personalized medicine by studying a population cross section that accurately represents U.S. demographics. Dr. Carroll showed several statistics demonstrating a persistent underrepresentation of non-European ancestry groups in biomedical studies. The All of Us Research Program is pursuing an intentionally diverse study population through community engagement partners and activities, including “community engagement studios” that endeavor to understand community needs and recruit and engage study participants.

Dr. Carroll stated that the All of Us Research Program is currently in the beta phase, with more than 20,000 participants recruited individually and through health care provider organizations. Data collection methods in use or in development include sharing of electronic health records, baseline physical measurements, genetic information, and biospecimens; health surveys gathering information about diet, physical activity, mental health, environmental exposures, and other variables; and sensors or wearable devices. Dr. Carroll commented that participation in health survey development offers an opportunity for EnHIP members to help define the information captured in order to better drive precision medicine.

Dr. Carroll and his colleagues at Vanderbilt’s Data Research Center are developing methods for curating the data, with goals of making the data accessible without compromising privacy/security or losing data context. They are also building tools to make the data useful. “The idea is to build this tool to have data in one place in the cloud and have tools that everyone can use and data that are well documented. Now

we can give approval to a much broader audience—even a middle school [student] could do a science fair project with the data.” Finally, Dr. Carroll stated that a key tenet of the All of Us Research Program is to give participants access to their health information. He noted that current patient portals are not designed to present test results to patients in a readily understandable manner.

VIII. Discussion and Q&A with Dr. Robert Carroll

The question-and-answer session following Dr. Carroll’s presentation was dominated by concerns about ensuring representativeness in the All of Us population sample. Dr. Carroll responded that he is not involved in the data-gathering aspect of the research, but community engagement partners in the All of Us Research Program are tasked with establishing relationships in underrepresented communities and engaging the people of the community. The partners are responsible for ensuring that participants feel respected and get answers to their questions.

Dr. Paul B. Tchounwou, Jackson State University, asked for more information about the community engagement studios. Dr. Carroll explained that the community engagement studios focus on ascertaining how the research program can provide value to participants. The objective is to find out what information the community would like to get back from the program, and this is continually updated in response to feedback from community members.

Dr. Hood expressed interest in participant-provided information pertaining to environmental exposure and occupational health, specifically whether the All of Us Research Program has plans for any relevant cell phone apps. Dr. Carroll replied that at present, no good mechanism exists for individuals to provide clinicians with real-time data. Rather, the focus has been participant enrichment, such as alerting participants to health trends in their communities.

Dr. Sarpong concluded the discussion with his personal observation that biomedical researchers have made great strides in engaging the community for data acquisition, but he believes dissemination of discoveries needs more effort. Research results must be translated into messages that inspire people to take action because intellectual discoveries on their own are not hitting the “emotional button” that prompts behavior modification. He counseled, “We need to change the paradigm so there is some balance, not just getting into the community and collecting data, but how do we disseminate data? Whether the group is representative or not, what needs to happen at the end of the day is the person who needs the information gets it in a way they can understand and takes action. That is where we are missing the boat.”

Dr. Matthews-Juarez reminded EnHIP members that Dr. Carroll mentioned two opportunities to participate in the All of Us Research Program: (1) development of survey modules and (2) participating in the community engagement aspects of the project.

IX. Public Health Exposome: Measuring the Impact of Environment on Health over the Life Course

Dr. Paul Juarez, Professor, Department of Family and Community Medicine, and Executive Director of the Health Disparities Research Center of Excellence at Meharry Medical College, has been collaborating with a transdisciplinary team of investigators over the last seven years to create a database that he calls the “Public Health Exposome.” This database captures the environmental component of health disparities. He stated that the research team is currently funded by a grant that will allow them to link environmental exposures over a lifetime—the exposome—to its impact on health. The population data under study in the research project are from a community cohort of 85,000 persons recruited in 12 southeastern states. Approximately half of the population is African-American, and almost the entire cohort is low income.

Dr. Juarez defined health disparities as “inequities that exist when some population groups do not benefit from the same health status as other groups.” He noted that the causes of health disparities are complex, and although 15%–16% of disparities can be attributed to genetics (the genome), a much higher percentage is attributable to environment and behavior. The challenges are to determine which environmental exposures affect health and to understand the sources of those exposures.

Traditionally, health science research has looked at simple cause and effect and has been hypothesis-driven. That is, the researcher hypothesizes that certain exposures may correlate with specific health outcomes and tests that hypothesis by using a small number of variables, such as biomarkers of exposure, and a predetermined set of health outcomes. Dr. Juarez explained that this approach often ignores the context of exposures (i.e., how they occurred) and limits the number of variables that can reasonably be studied. Dr. Juarez and his colleagues are making a paradigm shift to a data-driven approach. They are collecting data for more than 3,000 environmental exposure variables and disease outcomes and then using systems theory and super computers to discover patterns in the data. These patterns will then be used to generate hypotheses that address environmental exposure pathways and biological mechanisms of disease susceptibility.

X. Discussion and Q&A with Dr. Paul Juarez

Dr. Sarpong facilitated the discussion following Dr. Juarez’s presentation. Dr. Sarpong began the session with two anecdotes. The first recounted how Switzerland was once the world’s supplier of watches, but when quartz movement watches entered the market, Swiss watchmakers failed to embrace the new technology and lost their market dominance. Dr. Sarpong asked EnHIP representatives, “As scientists, are we willing to make a paradigm shift?” The second story recalled a time when Albert Einstein had given his students a test, and on the way back to his office, his assistant asked, “Wasn’t that the same exam you gave last year?” Dr. Einstein replied, “Yes, but in the last year, the answers have changed.” Likewise today, Dr. Sarpong believes the questions in disparities research remain the same, but how we answer those questions has to change. Dr. Sarpong concluded his commentary with the observation that health disparities research has focused on risk factors, or what he called the disease model. He put forth the scenario of a single ethnic-minority mother with three sons; two go to jail, and one becomes a physician. We typically will study the two who went to jail, but Dr. Sarpong argued that “we need to look at resilience and protective factors in that same environment.” What empowers some disadvantaged persons to thrive and excel?

Dr. Sandra Harris-Hooker, Morehouse School of Medicine, was among EnHIP representatives who expressed keen interest in the Public Health Exposome paradigm. Her interest was around financial stress as one of the variables under study that may have significant impact on health. Dr. Juarez responded that proxies for financial stress as well as biomarkers for other stressors are included in the Public Health Exposome database. He specifically referred to his current work with cohorts originally pulled together for the NIH Environmental Influences on Child Health Outcomes (ECHO) Program. Ongoing data collection from these cohorts will enable investigation into how stress during pregnancy affects the development of neurocognitive pathways. More discussion followed about stress as the underlying cause of disease. Dr. Juarez submitted that data-driven research allows us to look for common causes and origins of disease, such as stress, rather than just looking for single causes of diseases using limited samples.

Dr. Milton A. Morris, Benedict College, asked how the Public Health Exposome paradigm differentiates between environmental and genetic causes of disease. Dr. Juarez acknowledged that genetics predispose individuals to disease, and his research ties together environmental exposures and behaviors that trigger disease onset.

Mr. Scott also noted overlap between hazard risk management and health risk management. He proposed future discussion about how social-cultural factors exacerbate both hazard and health risks and suggested that data collection centered on these factors could resolve problems that span both fields.

XI. Impact of Environmental Toxins and Population Health

Dr. Hood began his presentation by congratulating Meharry for its role in effecting a public policy change. Data from several Meharry researchers were influential in the U.S. Environmental Protection Agency's (EPA) recent decision to develop a new reference concentration for benzo[a]pyrene in reproductive and developmental neurotoxicity studies.

Dr. Hood transitioned to a case study of the Public Health Exposome framework introduced earlier by Dr. Juarez. The subject population was a collection of neighborhoods in Columbus, Ohio, who had asked researchers at The Ohio State University in 2014 to investigate a high incidence of chronic diseases, which they believed might be tied to nearby pollution sources. The National Community Mapping Institute at Meharry assisted with creating a public participation geographic information system (GIS) portal for these communities to submit socio-demographic and health data, and the researchers collected additional health data from the Ohio Department of Health and other sources. Dr. Hood and his colleagues considered exposures from the built, natural, and physical environments by accessing data such as toxic release inventories, concentrations of ozone and 2.5-micron particulate matter in air, proximity to heavily traveled roadways, and concentrations of metals (e.g., lead) in soils. Overlaying EPA's Environmental Justice Screening and Mapping Tool with the various data sets revealed that some of the communities did indeed have disparate health outcomes associated with a range of pollution parameters, and one of the neighborhoods qualified as an environmental injustice community by EPA standards. Dr. Hood examined low birth weight and preterm birth as predictors of infant mortality in the study population, and the interrogation showed that preterm birth and low birth weight correlated with ozone levels in the air, proximity to hazardous waste sites (National Priority List locations), direct discharges to waterways, and other socioeconomic factors.

In conclusion, Dr. Hood noted that the role of resiliency—a person's capacity to recover from adversity—needs more study because the model assumes populations are adapting in response to stressors. He also pointed out that the model computes cumulative risk for a worst case scenario, while for particular individuals, risks and associated health outcomes can be influenced by behavior. He expects ongoing and future research to provide more refined results.

XII. Discussion and Q&A with Dr. Darryl Hood

Dr. Robert L. Copeland, Jr., Howard University, asked Dr. Hood about data he presented for blood lead levels in children. Dr. Copeland remarked that such data can be misleading because lead that has accrued from environmental exposures can move into the bone and escape detection in the blood. Dr. Hood acknowledged the problem but said his point was simply to show the wide range of blood lead concentrations corresponding to soil concentrations averaging 400 mcg/kg.

XIII. Citizen Science: Impact on Data-Driven Decision Making

Dr. Wansoo Im is an Associate Professor and Director of the National Community Mapping Institute (NCMI) in the Health Disparities Research Center of Excellence at Meharry. His presentation introduced EnHIP members to the services and capabilities available at the NCMI Web site (<http://communitymappingfortheequity.org/>), which includes a module for community mapping, static maps

of the Public Health Exposome, a “map of the day,” and several mapping projects. Dr. Im explained that the NCMI will map or graph publicly available or personally collected data for citizen scientists free of charge. The public can then use NCMI’s online tools to visualize the data various ways, discern patterns, and develop hypotheses. As an example, he showed two U.S. maps color coded to reflect diabetes incidence and obesity prevalence at the county level. The similar distribution patterns suggest a correlation, which could be investigated with further research.

Dr. Im defined citizen science as scientific research conducted, in whole or in part, by amateur or nonprofessional scientists. By using the NCMI community mapping tools, citizens can join in analyzing data collected via smart phone apps and social media, such as Twitter, and can also formulate hypotheses. Dr. Im described several citizen science projects, such as an NLM-sponsored project to use public-participation GIS methods and a smart phone app to map potential mosquito breeding grounds that could contribute to mosquito-borne diseases such as Zika. Another project, the Community Mapping Public Health Hackathon, assembled community members to identify public health issues and create apps to solve the issues by using community participatory mapping. Dr. Im concluded his presentation by asserting that the best way to innovate is to involve the community—“make the data available, make the process available, and brilliant ideas might come, one or two of which might solve the problem.”

XIV. Discussion and Q&A with Dr. Wansoo Im

Dr. Copeland asked Dr. Im how long it would take NCMI to produce a map during a disaster that shows, for example, where certain services are available and which businesses are open. Dr. Im’s group produced a map during Hurricane Sandy that identified which gas stations were open and had gas available at any given time. The data for that map was submitted by about 1,500 volunteers using smart phones or Web sites. Dr. Im said the map could be produced in about 10 minutes. Dr. Matthews-Juarez added that the background work for developing that type of map came out of a five-year study on disaster management and disaster preparedness funded by the National Institute on Minority Health and Health Disparities. Dr. Copeland also asked how the elderly, who may not be tech-savvy, could participate as citizen scientists. Dr. Im responded that intergenerational engagement (i.e., teaming seniors with youth) has worked well, not only from a technology standpoint but also from a community-building perspective.

XV. Engaging Communities through Data Sharing and Social Media

Dr. Katherine Brown, Director of Communities of Practice at the National Center for Medical Education, Development, and Research at Meharry Medical College, engaged the EnHIP audience with a presentation on the benefits and challenges of social media and data sharing. She explained that social media—Twitter, Instagram, and Facebook, for example—offers a free mode of communication and an opportunity to build a community and connect with stakeholders and others who have similar interests. Through social media, users create an online curriculum vitae that shapes and controls their personal or institutional brand. Dr. Brown pointed out that social media is faster than traditional avenues of sharing news and enables users to connect with a huge and diverse intergenerational audience; 22% of the world’s total population engages in social media. But she also cautioned that social media comes with a number of challenges, one of which is managing the time spent using social media. She suggested setting goals for content and frequency of social media posts.

To familiarize the audience with the practical use of social media, Dr. Brown provided more detail on Twitter, which she said is favored by most researchers (vs. Facebook or Instagram, which are more popular for connecting with personal friends and family). She described relevant terms, such as “tweet” and “retweet.”

explained the use of hashtags (#) and the “at” sign (@), and emphasized the importance of adding a photo and choosing a transportable user name. Dr. Brown also mentioned the polling option on Twitter to assess whether tweets are engaging the target audience. One cautionary note stressed by Dr. Brown is that “once you put it out there, you no longer own it.” Nothing is private once it is posted, even if the post is quickly retracted. After showing examples of various tweeting styles, she encouraged the audience to become Twitter users but also reminded them to consider privacy issues, content quality, target audience, ethics, and social media etiquette (e.g., avoid politics and be respectful).

XVI. Discussion and Q&A with Dr. Katherine Brown

Dr. Brown’s introduction to social media prompted many questions and comments, most of which dealt with the risks of using social media without carefully evaluating the consequences. Mr. Scott questioned the ethics of polls. “A poll is research, and there are institutions that do not allow research without going through a process. So you have to be careful. . . about what you are asking and what the implications are because you are putting your institution and your own professional status at risk.” Other participants added that institutions typically have their own social media policies and guidelines, and social media users affiliated with those institutions must stay within those boundaries. Dr. Matthews-Juarez said organizations need to consider having someone responsible for monitoring tweeting and filtering out inappropriate material. Dr. Taylor, who works with student nurses, highlighted the importance of boundaries in general. “Somebody has to teach our students where the boundaries are [and] how to protect their future by being careful of the image they create online. We have seen students miss opportunities, lose their job[s], [and] lose their license[s].”

Additional discussion focused on the positive aspects of social media, such as the ability to rapidly communicate what is happening during a crisis. Even traditional media outlets now use Twitter. Dr. Matthews-Juarez made the point that, just as personal computers and then smart phones were quickly adopted by the public, now social media is the new way to communicate, and it is being used at the highest levels.

XVII. The Role of Librarians in Data Science and Management

Ms. Green, Library Director and Associate Vice President of Institutional Technology at Meharry Medical College, presented an overview of the advanced capabilities of today’s librarians. Much of their training is centered on data, from curation to visualization and analysis. As the demand for more sophisticated skill sets increases, libraries are hiring chemists, computer scientists, and research scientists who have overlaid that background with a library science degree. Ms. Green said that librarians can play a role in data discovery and accessibility because they know the range of available resources and how to bring those resources to the user in the most cost-effective way. For example, she stated the NNLM will provide one-on-one consultations for specific database needs⁴. Alternatively, researchers may want to access data sets via links in the NLM online catalog. Librarians can also assist with creating institutional data repositories to archive and preserve data and other intellectual property for future use. Ms. Green encouraged the audience to use librarians’ knowledge and discover what the new generation of librarians can do for them.

⁴ The National Center for Biotechnology Information (NCBI) also provides help through the NCBI Help Desk (<https://www.ncbi.nlm.nih.gov/home/about/contact/>). Users may submit questions about NCBI programs and services and can also submit requests for technical support for data or services.

XVIII. Discussion and Q&A with Ms. Brenda Green

An extended discussion followed Ms. Green’s talk, initiated by Dr. Taylor’s questions regarding who owns data and intellectual property and how researchers can differentiate between legitimate and predatory journals. The audience consensus was that ownership of data and intellectual property has many facets that complicate the picture. If federal tax dollars fund the research and discoveries, the public owns the data. However, third parties can charge for publicly owned data if they have done something to make the data more accessible. In the case of patient data, the patient is usually the owner, but ownership can depend on who paid for collecting the data. Ms. Green commented that publishing data adds another layer of complexity because journals can “embargo” data and make it unavailable for many months. Depending on how data is published, researchers can inadvertently give away the copyright to the publisher. A number of journals are starting to offer open access to data, and publishers are being pressured to release data more quickly, but they have been slow to respond. Finally, when data sets are free, Dr. Matthews-Juarez cautioned that sometimes issues of trustworthiness and usability arise.

The matter of intellectual property ownership is equally complicated, and Dr. Matthews-Juarez said the answer varies on a case-by-case basis. Institutions typically have intellectual property ownership policies, and researchers should read those carefully. In some cases, numerous parties are involved, in addition to the researcher and institution.

Ms. Green concluded the discussion with a response to Dr. Taylor’s question about predatory journals. She said most libraries have lists of predatory journals, and the lists are also available online. Librarians want to make sure researchers do not fall prey to these journals and can help identify the red flags that signal a possible problem.

XIX. Networking around Questions of Data in Precision Medicine, Health Disparities Research, Education, and Clinical Services

Dr. Warren began the networking session by raising awareness of research at Tuskegee on the barriers and challenges for African-American participation in clinical trials. He said issues of trustworthiness have discouraged African-Americans from participating, but population diversity in clinical trials is critical for ensuring that African-Americans benefit from the advances in health research. He offered to send electronic copies of the associated proceedings and articles to anyone interested in the research and then asked meeting attendees for their reflections on the day’s conversations.

Mr. Scott suggested that EnHIP consider performing an assessment of information resources, social media use, and the role of information technology in the communities EnHIP serves. Dr. Berger extended that to include the implications of data and Internet access on the use of informatics in rural communities that do not get good Internet reception. She mentioned that another barrier she would like to see addressed is the need for interpreters to translate information into the languages of minorities in rural communities.

Dr. Hood mentioned the parallel missions of the Minority Health Professionals Foundation and EnHIP, both of which advocate for minorities in health professions. He thought EnHIP institutions should consider funding opportunities through the Foundation.

Dr. Jannett Lewis-Clark, Tuskegee University, asked for more transparency on where big data comes from. She questioned how researchers can feel comfortable using somebody else’s data without a better understanding of its source and context. Dr. Matthews-Juarez pointed out that big data is used differently than smaller, traditional data sets. Big data has been collected, curated, and put in repositories, so researchers

are accessing secondary data sets. Unlike hypothesis-driven research, data-driven research does not test a hypothesis but rather makes use of analytical tools to detect patterns in the data that can then drive the formulation of questions and further research. She cautioned that big data can include data from both well-conceived and ill-conceived studies, and the researcher must critically evaluate the study design before deciding whether to use the data.

Dr. Stephanie Bauer, University of Alaska Anchorage, discussed Dr. Warren's question of trustworthiness as it pertains to doing research with minority groups, such as Alaska Natives. She asked how researchers can earn trustworthiness in these communities and felt that using a participatory model of research, engaging study populations in citizen science, and offering the benefits of personalized medicine can help researchers better connect with their study populations. If people are fully engaged in gathering the data from beginning to end and can see how it is relevant to them, perhaps the element of trustworthiness can be established.

Dr. Taylor noted that she was moved by the direction and goals of the NLM strategic plan and wanted to understand how EnHIP institutions can prepare their students for the future workforce. She asked how EnHIP members can motivate students to respond to the urgent need for data scientists and other science, technology, engineering, and mathematics (STEM) professionals. Dr. Hood replied that The Ohio State University has a robust program in data analytics and offers several training opportunities for minorities. They will partner with minority-serving institutions and have summer programs for students. Dr. Harris-Hooker agreed that training is needed as well as funding to support that training.

XX. Report from the EnHIP Chair

Dr. Matthews-Juarez began her report with a reminder of the mutually supportive relationship between EnHIP and NLM. She commended EnHIP members for communicating well with the EnHIP executive committee, which resulted in a more productive effort to align the work of EnHIP with the mission of NLM.

Dr. Matthews-Juarez spoke about the opportunities for EnHIP to collaborate with groups, such as the Association of Minority Health Professions Schools (AMHPS), and with one another. She encouraged EnHIP members to identify the resources at their respective institutions and think about how they can collaborate for the benefit of all.

As part of that effort, Dr. Matthews-Juarez proposed that EnHIP continue to engage in extended discussion around the issues of data science and data use, and how EnHIP can contribute to workforce development, particularly by sharing resources. She stressed the importance of expanding the community of data scientists through education and training at EnHIP institutions. Drawing on presentations earlier in the day, she asked the representatives to consider the use of social media to call attention to EnHIP and the important work they do. She concluded her report by urging EnHIP members to share their ideas and let their voices be heard in a way that will be helpful to NLM and their institutions.

Day 2

XXI. Welcome and Introductions

Dr. Patricia Matthews-Juarez, Meharry Medical College, welcomed everyone to the second day of the annual meeting. She commented that several new representatives joined EnHIP this year and asked them to state their names and affiliations. Dr. Zivar Yousefipour, Texas Southern University, and Dr. Betty Damask Bembenek, Colorado Mountain College, said they were substituting for the EnHIP representatives from their respective institutions and may become permanent replacements. Dr. Syreeta Tilghman, Florida A&M

University, mentioned that she was attending at the request of her university’s dean and also may become a permanent member. Dr. Daniel Sarpong, Xavier University of Louisiana, and Dr. Candyce Berger, The University of Texas at El Paso, introduced themselves as new representatives.

Dr. Matthews-Juarez introduced the first speaker of the day, Ms. Jennifer Reynolds of Oak Ridge Associated Universities. Dr. Matthews-Juarez commented that opioid abuse is a difficult problem, and Appalachia is one of the hardest hit areas. Ms. Reynolds has been working to address the opioid communication needs in Appalachia.

XXII. Understanding Opioid Communication Needs through Qualitative Research with Subject Matter and Community Experts

Ms. Reynolds described a project she undertook in 2016–2017 to help Appalachian community-based organizations build the capacity and tools for communicating opioid abuse prevention messages. Appalachia encompasses a very large area, including parts of 13 states, with diverse populations, significant health disparities, and—in some rural areas—limited communication options. Early discussions with the community organizations suggested the use of social media to disseminate messages, and so Ms. Reynolds’s team cultivated their relationship with the communities through social media training sessions. To design effective messaging strategies, Ms. Reynolds conducted interviews with local and regional experts who were well-versed in the opioid abuse issue, and she also organized community engagement sessions to collect critical input from community members.

Ms. Reynolds’s team found that community members were well equipped to understand their communities’ health problems and provide constructive advice on how to focus opioid abuse prevention messages. The members advocated messages of hope rather than despair and suggested using stories of recovering addicts in their communities instead of featuring before-and-after photos of a healthy person turned addict. The discussions with community members revealed a need for direct and familiar language (“he died” vs. “he passed on”; “prescription pain meds” vs. “opioids”) and highlighted the importance of family-centered messages. Ms. Reynolds concluded her presentation with some words of advice about conducting research in Appalachia, most notably that community participation is key from the beginning.

XXIII. Discussion and Q&A with Ms. Jennifer Reynolds

Ms. Reynolds’s presentation was very well received and garnered many compliments. Dr. Darryl Hood, The Ohio State University, started the Q&A session with the observation that the Appalachian communities Ms. Reynolds studied are very different from urban minority populations with respect to the development of opioid abuse prevention messaging. Ms. Reynolds acknowledged the differences and commented that in urban areas, the model is more about harm reduction, whereas in heavily religious, rural communities, such as those she studied, the abstinence model resonates better with the culture.

Several EnHIP members had questions or comments about the rigor of qualitative research, such as ensuring a representative sample population. Ms. Reynolds responded that scientific rigor must be balanced with gaining community trust and eliciting meaningful, authentic information, all within budget constraints. Dr. Berger concurred with Ms. Reynolds and added that talking with communities should have priority over scientific rigor, before launching into a research project without understanding the real concerns of the community. Dr. Sarpong agreed that soliciting early community input allows citizens to say what works for them and can produce a more satisfactory result for the community. Mr. John C. Scott, Center for Public Service Communications, stated that discussions with study populations must factor in cultural competency, specifically linguistic competence and use of a community’s vocabulary rather than scientific terms.

Further conversation dealt with the type of opioids used by addicts as well as the issue of opioid overprescription. Dr. Doris Withers, Medgar Evers College, CUNY, was interested in the regional distribution of opioid choice (heroin vs. prescription opioids) and asked if Ms. Reynolds had looked at populations where heroin was the preferred opioid. Ms. Reynolds said the emphasis has been on abuse of prescription medications, but the U.S. Department of Justice and district attorneys are looking at the role of the illegal drug trade. Dr. Milton A. Morris, Benedict College, asked how overprescription of opioids is defined. Dr. Robert L. Copeland, Jr., Howard University, responded with an explanation of acute versus chronic pain; opioids should be prescribed to suppress acute pain but are often prescribed for much longer. Ms. Reynolds commented that some states are legally mandating the time course of opioid prescriptions, and physicians and pharmacists need to give patients more instruction on taking opioid prescriptions, such as using the minimum amount needed and not sharing the prescription with others.

XXIV. Overview of Tribal Epidemiology Centers

Ms. Pamela Staples, United South and Eastern Tribes, Inc. (USET), described the network of twelve Tribal Epidemiology Centers (TEC) located across the United States⁵. Ms. Staples works for the TEC in Nashville, which represents 27 tribes in the southern and eastern states. The TECs serve American Indians and Alaska Natives by assisting in disease prevention and control, managing public health information systems, identifying health risks and inequities, responding to public health emergencies, and coordinating tribal public-health-related activities with other public health authorities.

Ms. Staples stated that a key part of their work involves data collection, curation, and analysis for disease surveillance and for preparation of disease prevalence reports, among other uses. Collection of data through community health assessments, focus groups, and surveys helps TECs assist member tribes in identifying health priorities and improving health care delivery. She enumerated some of the challenges TECs face with respect to collecting, curating, and analyzing data, including nonuniformity of electronic health records, access to existing data (because some states and government agencies do not recognize TECs' public health authority), small population sizes, and tracking down data from outsourced services.

The final section of Ms. Staples's presentation focused on communication tools for health promotion and disease prevention. USET has an ongoing project to develop health-related messages through digital storytelling, using a readily available app. They have also created infographics and PowToon videos to convey large quantities of information in a very condensed format. Ms. Staples said a "TEC Best Practices Report" is publicly available and showcases the work of the TECs. She encouraged EnHIP representatives to contact her for more information about TECs, USET, and the materials she presented.

XXV. Discussion and Q&A with Ms. Pamela Staples

The EnHIP representatives were very interested in Ms. Staples's presentation and asked for her input on various topics. Mr. Phillip Cody Marshall, Haskell Indian Nations University, and Dr. Cheryl Taylor, Southern University, Baton Rouge, asked about disease prevalence and substance abuse among the tribal nations. Ms. Staples said obesity and diabetes are widespread, but the prevalence of other diseases is highly variable. Substance abuse is a major problem that the TECs are currently addressing.

⁵ The twelve TECs are the Alaska Native TEC; Albuquerque Area Southwest TEC; California TEC; Great Lakes Inter-Tribal Epidemiology Center; Inter Tribal Council of Arizona, Inc. TEC; Navajo Nation TEC; Northern Plains TEC; Northwest Portland Area TEC; Oklahoma Area TEC; Rocky Mountain TEC; United South and Eastern Tribes TEC; and the Urban Indian Health Institute in Seattle, Washington.

Dr. Taylor and Dr. Stephanie Bauer, University of Alaska Anchorage, asked questions related to conducting research and working with tribal nations. Ms. Staples said research must be approved by the Institutional Review Board. Conducting research with tribal members can be difficult because of trust issues. She noted the importance of openness and honesty as well as cultural competence. Giving tribal members as much control as possible over the content and distribution of videos, for example, is helpful.

XXVI. NLM Strategic Plan Discussion

Dr. Matthews-Juarez introduced Ms. Janice E. Kelly, Acting Deputy Associate Director and Chief of the Outreach and Special Populations branch at the NLM. Ms. Kelly requested feedback and constructive comments on how the NLM strategic plan fits with EnHIP's plans and also how NLM and EnHIP can support one another. She reviewed the goals of the NLM strategic plan and commented that the plan reflects the data science plan of NIH.

Many EnHIP representatives shared their thoughts and ideas on how EnHIP can work with NLM to realize the goals of the strategic plan. Ms. Dolores E. Caffey-Fleming, Charles R. Drew University of Medicine and Science, recommended that EnHIP collaborate with AMHPS or other organizations to leverage EnHIP's efforts to build the workforce. Mr. Marshall inquired about NLM tools and methods for enhancing dissemination of information (Goal 2). Ms. Kelly responded that NLM has more than 6,500 libraries in their network that help with dissemination of information. NLM also uses exhibits, community projects, social media, and cooperative work with scientific and professional organizations, such as EnHIP. She referred Mr. Marshall to the National Network of Libraries of Medicine Web site (<https://nmlm.gov>) for more information.

The remainder of the discussion focused on Goal 3 of the strategic plan: build a workforce for data-driven research and health. The general consensus was that EnHIP members should solicit input from their communities and stakeholders and then decide as a group on specific implementation goals and objectives. Once these have been established, EnHIP members can form working groups, each of which will be tasked with designing practical strategies for reaching one or two of the goals. Part of this whole process is defining relevant library career positions and their associated skill sets.

Several people shared information about existing opportunities that could assist with education and training while EnHIP institutions build their own programs. For example, Ms. Kelly said summer internship programs are available through various NLM associations and networks. Ms. Shannon Jordan, Division of Specialized Information Services, NLM, stated that NLM can provide online or in-person training on how to use NLMs resources and content. These training resources could also be part of an undergraduate curriculum to steer students in the direction of a library school or data science program. Dr. Paul B. Tchounwou, Jackson State University, encouraged everyone to read a 2018 report from the National Academies of Sciences, Engineering, and Medicine entitled "Envisioning the Data Science Discipline: The Undergraduate Perspective: Interim Report."⁶

A few EnHIP representatives thought it prudent to spark the interest of minority students early, in middle and high school. Dr. Tilghman remarked, "We have a really untapped audience in our high school students. They are really passionate, they are really vigilant... Sometimes if we wait until the undergraduate level to start disseminating the information, it is too late. Many of them may not even get to the undergraduate level." Ms. Kelly said NLM works with high schools and finds it fruitful—NLM apps and use of data sets for citizen science projects can engage high school students.

⁶ The interim report can be downloaded from the following Web site: <https://www.nap.edu/catalog/24886/envisioning-the-data-science-discipline-the-undergraduate-perspective-interim-report>

A concern for several EnHIP representatives was access to technologies—high speed Internet, for example—that would allow their communities to participate in building the workforce. In reference to such communities, Mr. Scott asked, “How can you ensure these communities are participating in the process of big data and it is not just something being done to them or on their behalf?” Dr. Bauer voiced a similar concern and also recommended that some thought be given to issues of cultural competence.

Dr. Matthews-Juarez concluded the discussion with a comment about where to secure funding for activities supporting the NLM strategic plan. She mentioned the Health Careers Opportunity Program available through the Health Resources and Services Administration. Ms. Kelly also recommended scholarship funding for students, specifically the Spectrum Scholarships through the American Library Association, intended for students who wish to pursue graduate-level training to become librarians or data scientists.

XXVII. Closing Remarks

Dr. Rueben Warren, Tuskegee University, asked the EnHIP members to consider one final question: “Is your institution trustworthy?” He made the point that if an institution is not trustworthy, then its individual members lose their trustworthiness. He stated that EnHIP’s collective wisdom must be trustworthy to have credibility. As a group, EnHIP has moral authority to speak on important matters, and its affiliation and cooperative work with the NLM are tremendously empowering.

Ms. LaFrancis Gibson, Oak Ridge Associated Universities, spoke briefly to EnHIP members about reimbursement and travel logistics.

Dr. Matthews-Juarez thanked Oak Ridge Associated Universities and EnHIP membership for their participation. She extended special thanks to Mr. Scott, who is retiring after serving as a consultant to EnHIP for 21 years. Dr. Matthews-Juarez also thanked the Meharry Medical College as well as Dr. Hildreth, President and CEO of Meharry Medical College, for leadership and a commitment to EnHIP. She expressed appreciation for the time and effort made by Dr. Hildreth, Dr. Mallett, and Ms. Green to participate in the meeting. Finally, Dr. Matthews-Juarez thanked all the EnHIP representatives for bringing their thoughts and expertise to the annual meeting to discuss the use of data to improve the health and quality of life for all Americans.

The meeting was adjourned at 11:45 a.m.

APPENDIX A

Environmental Health Information Partnership Meeting—March 28-29, 2018

**NATIONAL LIBRARY OF MEDICINE®
DIVISION OF SPECIALIZED INFORMATION SERVICES
ENVIRONMENTAL HEALTH INFORMATION PARTNERSHIP MEETING**

Charting a Course for the 21st Century

Environmental Health Information Partnership Strategic Plan

INTRODUCTION

Environmental Health Information Partnership

The Environmental Health Information Partnership (EnHIP) was established by the National Library of Medicine (NLM) in 1991 as the Toxicology Information Outreach Panel. This group was started at a time in which the issue of racial and ethnic health disparities in a myriad of conditions had been elevated into sharp visibility. There was also concern about disparities in potential and real exposure to environmental toxicants and their contribution to disparities in morbidity and mortality. At the same time there was an increase in the complex literature of toxicological science. The Panel then evolved into the Environmental Health Information Outreach Program and subsequently refined into the current state, the Environmental Health Information Partnership. This Partnership reflects a broader focus on the multiple dimensions of environmental health, the environmental health sciences, and health disparities. The objective is to assist in addressing disparities among academic institutions in access to information technology and related pedagogical and research resources.

In this context, it was increasingly recognized that modern instruction, research, and service to communities, students, and professions—the core mission of academic institutions—were nearly impossible without computers and related technologies. Indeed, evidence abounds that the addition of computer science and bioinformatics to the arsenal of environmental health, biomedical, social, behavioral, and clinical research holds enormous promise and continues to stir considerable excitement among researchers, academicians, practitioners, and the entire health services community.

These were among the developments that prompted the NLM to initiate a series of programs and services specifically designed to expand and strengthen its partnership with Minority-Serving Institutions (MSIs) and, in the process, enhance the efforts of these schools to increase the number of racial and ethnic minorities in the environmental health, biomedical research, and health care workforce. The NLM was also interested in ensuring that, through planned outreach efforts, both lay and professional groups were aware of, had ready access to, and utilized the NLMs rapidly expanding collections of medical and health information.

Working together, the NLM and the participating colleges and universities continue to apply themselves to these efforts as the 21st century becomes the digital era, creating a better and a more innovative and collaborative future.

Rationale and Process

The Environmental Health Information Partnership has made substantial progress during the past decade in achieving its initial objectives. A prominent feature of this progress has been information sharing, including regular NLM staff reports on the continuous expansion of the Library databases and programs, as well as presentations from other National Institutes of Health (NIH) Institutes and Centers on development in other areas of the NIH, which supports research and discovery that ultimately improves the methods and outcomes of public health services and personal health care. These discussions have added to the substrate of information that academicians need to bring to full fruition the core functions of academic institutions.

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The challenge for the Partnership is not only to maintain its role as a progressive component of NLMs outreach efforts, but to advance to even higher levels of productivity consistent with the NLM Long Range Plan (2006–2016) (Charting a Course for the 21st Century: NLM's Long Range Plan 2006–2016; http://www.nlm.nih.gov/pubs/plan/lrp06/NLM_LRP2006_WEB.pdf). That plan includes four overall objectives that serve as the reference frame for the Partnership strategic planning process.

The process began with a number of discussions within the Executive Committee, the administrative arm of the Partnership. These discussions, by teleconference as well as face-to-face interactions at the Library on the NIH campus, culminated in a comprehensive review of the NLM Board of Regents-endorsed new 10-year Long Range Plan.

Later, in meetings at the Library, the Partnership organized into four working groups, consistent with the NLM plan's four goals. Each group was charged with sorting from the 66-page Library plan challenges, and strategies for the partnership—all within the context of the overarching mission of the Library.

The outcome was a report of each working group's deliberations. As with any broad-ranging discussion among multidisciplinary academicians with differing perspectives, numerous important and relevant topics were discussed, a number of which were beyond the boundaries of NLMs statutory responsibilities. The Executive Committee attempted to capture the key themes of all of the working group reports. The results of that effort are reflected in the plan that follows.

Henry Lewis III, Professor and Dean
College of Pharmacy and Pharmaceutical Sciences
Florida A&M University, Tallahassee, Florida
Chairman, National Library of Medicine Environmental Health Information Partnership

VISION

EnHIP will be a strong, stable, and effective partner of NLM as the Library becomes even more central to scientific discovery and treatment and prevention of disease. Through this partnership, NLMs programs and services, adapted to 21st century health and health sciences developments, will further strengthen the capacity of MSIs to perform three important and fundamental functions within the public health and health care system. These are (1) educate and train health professionals; (2) conduct basic and applied research in disciplines pertinent to biomedicine, health services, health care, and health disparities; and (3) engage in community, public, and professional services.

MISSION

The mission of the Environmental Health Information Partnership is to enhance the capacity of minority serving academic institutions to reduce health disparities through the access, use and delivery of environmental health information on their campuses and in their communities.

Assumptions: Environmental health refers to the impact of chemical, microbial, physical, and radiological agents on the health of living organisms.

Minority serving educational institutions are those served by programs funded under Title III Historically Black Colleges and Universities, American Indian Tribally Controlled Colleges and Universities, Alaska Native and Native Hawaiian Serving Institutions, and

Title V Hispanic Serving Institutions. (Reference: U.S. Department of Education, <http://www.ed.gov/about/offices/list/ope/index.html>).

STRATEGIC GOALS

Goal 1. Seamless, Uninterrupted Access to Expanding Collections of Biomedical Data, Medical Knowledge, and Health Information

Objectives of the Partnership for Achieving Goal 1

- Assess the current capacity of MSIs to access NLMs databases and related Library resources that can enhance efforts of these colleges and universities to carry out their fundamental mission.
- Use the above-cited assessment to develop a program that will address the deficiencies revealed in the survey.
- Expand and intensify efforts to ensure that MSI faculty and students are thoroughly knowledgeable of detailed aspects of NLMs collections of health and biomedical information.
- Provide technical assistance and related resources to aid MSIs in increasing knowledge and use of NLM programs and services by lay and professional groups within their surrounding communities.
- Initiate appropriate action to include selected MSI libraries in the National Network of Libraries of Medicine (NN/LM).
- Initiate the necessary administrative and logistical procedures to ensure that future NLM exhibits are available for display in MSI communities.
- Convene a seminar, first at NLM and then at MSIs, on the “hows and whys” of disaster management information.
- Determine the extent of instruction in disaster management at MSIs and potential interest in disaster management information research consistent with the research agenda that may emerge from the NLM Disaster Information Management Research Center (DIMRC).

Goal 2. Trusted Information Services that Promote Health Literacy and the Reduction of Health Disparities

Objectives of the Partnership for Achieving Goal 2

- Structure a program to provide opportunities for interested students from MSIs to gain “field experience” (i.e., internships) in the operational aspects of NLM, including the management of the expansive databases and related activities.
- Initiate discussions with consumer advocacy groups in MSI communities to plan an intensive consumer awareness campaign designed to increase the number of consumers who are aware of and use NLMs free, high-quality consumer information resources.
- Develop specific recommendations for increasing the number of underrepresented minorities in the library sciences workforce.
- Convene a symposium on research advances in environmental health, climate change effects, and the animal-human connection as it relates to disease, designed to enhance the understanding of librarians of the multiple dimensions of the confederations of disciplines that comprise the environmental health sciences and the implications of these advances for both NLM programs and services and for those of local library services.
- Emphasize and promote the importance of MSI community high school teachers’ and students’ understanding of environmental health, climate change, and the animal-human connection as it relates to disease, as well as knowledge and use of NLM environmental health databases.

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Goal 3. Integrated Biomedical, Clinical, and Public Health Information Systems that Promote Scientific Discovery and Speed the Translation of Research into Practice

Objectives of the Partnership for Achieving Goal 3

- Determine the extent of electronic medical records use by physicians, hospitals, and clinics in MSI communities.
- Use data from the preceding objective as the basis for a seminar/discussion on the development of electronic health records, including presentations of case studies in which health records were essential sources of data.
- Increase MSI faculty members' awareness of the value of electronic health records in environmental health and related research.
- Enhance MSI faculty involvement in translation of public health research findings and knowledge to evidence-based practice.
- Expand Partnership understanding of the NLM online resources and their relevance to the mission of MSIs.
- Increase MSI students' and communities' knowledge of "hows and whys" of the NLM online resources and their relevance to consumer and academic services.
- Attract new students to the field of environmental health research, including the study of climate change effects, comparative medicine, and vector-borne diseases.
- Play a leadership role in encouraging community engagement in research activities of MSIs.
- Increase research productivity and, in the process, increase contributions of MSI faculty members to professional journals.

Goal 4. A Strong and Diverse Workforce for Biomedical Informatics Research, Systems Development, and Innovative Service Delivery

Objectives of the Partnership for Achieving Goal 4

- Increase NLM/Partnership visibility in MSI communities.
- Increase Partnership knowledge of NLMs programs and services designed to shape biomedical informatics education and training.
- Play a leadership role in initiating discussions of career opportunities in biomedical informatics and library science, including the promotion of interest in these careers.
- Ensure a prominent role for the NLM/Partnership in "career day" or similar programs at MSIs.
- Attract new MSI students to health sciences librarianship through NLMs postgraduate Associate Fellowship Program.

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DIRECTORY OF GUEST SPEAKERS

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ENVIRONMENTAL HEALTH INFORMATION PARTNERSHIP MEETING

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BIOGRAPHIES

Patricia Flatley Brennan, RN, PhD, is director of the National Library of Medicine (NLM). She came to NLM in August 2016 from the University of Wisconsin-Madison, where she was a professor in the School of Nursing and College of Engineering. She is a pioneer in the development of innovative information systems and services, such as ComputerLink, an electronic network designed to improve the lives of home care patients and increase their independence. She directed HeartCare, a Web-based information service that helps home-dwelling cardiac patients recover faster and with fewer symptoms, and Project Health Design, an initiative designed to stimulate the next generation of personal health records.

A past president of the American Medical Informatics Association, Dr. Brennan was elected to the Institute of Medicine in 2001. She is a fellow of the American Academy of Nursing, the American College of Medical Informatics, and the New York Academy of Medicine.

Katherine Brown, EdD, OTR/L, serves as director of the Communities of Practice for the National Center for Medical Education, Development and Research at Meharry Medical College. Her background includes working nationally and internationally with organizations, networks, and agencies, speaking on chronic diseases, health disparities, and innovative strategies, including faith-based health initiatives focused on vulnerable populations. She has lectured at prestigious academic institutions nationwide, including Johns Hopkins University and Vanderbilt University School of Medicine. She serves on the National Minority Health Committee for the American Heart Association, for the National Stroke Association, and has been a national CPR ambassador for Learn CPR America. Using her expertise and national network, she founded the Roberta Baines Wheeler Pulmonary Hypertension Awareness Group in honor of Ms. Roberta Baines Wheeler, her late mother, to increase awareness of pulmonary hypertension. The nonprofit has developed a program, Katherine Y. Brown Leadership Academy, to expose high school students to leadership development while also educating them on pulmonary hypertension and careers in healthcare. In 2015 she was the recipient of the prestigious Athena International Young Professional Award, and in 2016 she had the distinction of being inducted into the YWCA Academy for Women of Achievement.

Robert Carroll, PhD, is a research assistant professor of biomedical informatics at Vanderbilt University. His focus is on research using electronic health record (EHR) data tied to DNA biobanks. In the field of phenotyping individuals through EHR data, he has developed and applied algorithms and machine learning methods to predict disease state and drug response. These works include showing the portability of a logistic regression model for phenotype identification across several sites. He is the primary author and maintainer of a package for R implementing phenome-wide association studies (PheWAS), a tool that makes the method more accessible to researchers and has been used throughout the eMERGE Network and elsewhere. He is an investigator in the eMERGE Network and other consortia, implementing and designing methods intended for EHR-based cohorts that have led to new genetic associations. He also works with the Vanderbilt Institute for Clinical and Translational Research, assisting in the development of the Synthetic and Research Derivatives.

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Brenda Green, MLS, FMLA, is the associate vice president/library director at Meharry Medical College. Ms. Green provides leadership and overall administration, organization, planning, and management of library operations. Ms. Green also provides expertise in introducing innovative and effective technology in library services and managing all aspects of library services, collection development, strategic planning, budget administration (including endowments and grants), personnel management, policy formulation, and facilities as well as supervises and manages the College Archives and Special Collections Department.

Ms. Green has held faculty, staff, and leadership positions at medical libraries at George Washington University Medical Center, Vanderbilt University Medical Center, the University of Tennessee Health Science Center, and, most recently, Dartmouth College Library. Also, Ms. Green has held elected and appointed leadership positions in the Southern Chapter of the Medical Library Association (SC/MLA). She has given 14 presentations during regional and national conferences and has authored 25 posters and/or publications. She has received more than 10 funding awards from the National Network/Libraries of Medicine, Southeastern/Atlantic Region, in addition to receiving a subcontract award from the prestigious Institute of Museum and Library Services' Librarians for the 21st Century grant with Johns Hopkins University as the lead institution. In 2010, Ms. Green received the T. Mark Hodges Outstanding Service Award; in 2014 the Academic Librarian of the Year Award; and in 2017, Ms. Green was selected by the Board of Directors of the Medical Library Association as a 2017 Fellow of the Medical Library Association. Ms. Green has a bachelor of arts degree from Mississippi University for Women and a master of library science degree from the University of Southern Mississippi.

Darryl H. Hood, PhD, is an associate professor in the Division of Environmental Health Sciences at The Ohio State University. Dr. Hood is co-architect of the novel Public Health Exposome framework. This paradigm-altering framework interrogates hypotheses focused on determining if there are associations between the built, natural, and social environment and disparate health outcomes observed in vulnerable populations. Dr. Hood's overall contributions to science have resulted in confirmation that common environmental contaminants, such as benzo(a)pyrene [B(a)P] can have direct, negative impacts on the developmental expression of key regulators of glutamatergic signaling with associated negative impacts on behavioral learning and memory processes. His cumulative work over two decades was recently recognized by the U.S. Environmental Protection Agency (EPA) in the 2017 Integrated Risk Information System Assessment (IRIS) for B(a)P, which cited multiple articles from his laboratory as a basis for recalibrating the reference concentrations for inhaled B(a)P exposures in reproductive and neurotoxicity studies. Additionally, at The Ohio State University, Dr. Hood has continued his robust environmental justice work in the high risk and vulnerable, underrepresented minority communities of Columbus, Ohio.

Dr. Hood has 105 peer-reviewed publications, including book chapters, and has mentored more than 15 MSPH/MPH students, 15 PhD candidates, and 9 postdoctoral fellows. He continues to serve on numerous editorial and review boards for scientific journals, government agencies, and academia. Most recently (2010–2016), he served on the EPA Exposure and Human Health Subcommittee of the Science Advisory Board. He was also recently elected president of Toxicologists of African Origin, a Society of Toxicology special interest group, which he covets as a very special honor.

Wansoo Im, PhD, is director of the National Community Mapping Institute, a researcher in the Health Disparities Research Center of Excellence, and an associate professor of family and community medicine at Meharry Medical College. He specializes in developing decision support systems by using a public participatory approach to the Geographic Information System (GIS). He joined the faculty in 2016 to lead the National Community Mapping Institute and curate public health exposome data with complete

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metadata. He has pioneered the use of interactive, Web- and mobile-based GIS to support community-based participation and research on social and environmental issues. Dr. Im holds bachelor's, master's and doctorate degrees in urban planning.

Paul Juarez, PhD, is professor and vice chair for research in the Department of Family and Community Medicine and executive director of the Health Disparities Research Center of Excellence at Meharry Medical College. Dr. Juarez has established a transdisciplinary research team to apply systems theory and a public health exposome approach to pursue a health disparities research agenda. His team currently is linking the public health exposome database—a database of more than 30,000 exposure variables from the natural, built, and social environments—to clinical and genomic data sets to increase understanding of the biological pathways through which exposures affect health and developmental outcomes, using a lifespan approach. Currently, Dr. Juarez is the principal investigator (PI) of an EPA STAR grant award (Using a Total Environment Framework [Built, Natural, Social Environments] to Assess Life-Long Health Effects of Chemical Exposures); PI of an National Institute of Allergy and Infectious Diseases (NIAID) award (HIV Preexposure Prophylaxis Implementation Science); and PI of a National Institute of Environmental Health Sciences (NIEHS) sub-award (Prenatal and Early Childhood Pathways to Health award—C. Karr, PI).

Patricia Matthews-Juarez, PhD, is Meharry Medical College's vice president for faculty affairs and development, and she serves as a professor in the Department of Family and Community Medicine. She works on environmental health disparities and research training at Meharry's Health Disparities Research Center of Excellence.

From April 2013 through August 2015, she was cofounding director of the Research Center on Health Disparities, Equity, and the Exposome (RCHDEE) and a professor in the Department of Preventive Medicine at the University of Tennessee Health Science Center, Memphis. Prior to her work with RCHDEE, Dr. Matthews-Juarez was a professor in Meharry's Department of Pediatrics and the founding dean and associate vice president of the Office of Faculty Affairs and Development. She holds a bachelor's degree from Fisk University, a master's degree from New York University, and a doctorate from Brandeis University.

Janice E. Kelly, MLS, is the acting deputy associate director and chief of the Outreach and Special Populations Branch in the Division of Specialized Information Services at the National Library of Medicine. Ms. Kelly manages the staff responsible for outreach programs, a number of specialized Web sites, promotional activities, and the SIS exhibit program.

Previously Ms. Kelly was executive director of the National Network of Libraries of Medicine (NNLM), Southeastern/Atlantic (SE/A) Region at the University of Maryland, Baltimore, and served as associate director of the NNLM Greater Midwest Region. She has directed many outreach initiatives involving libraries and community agencies, expanded the educational programs of the SE/A Region, and managed an award program directed at health professionals and consumers in support of the mission of NNLM. Ms. Kelly also held positions in academic health sciences libraries, a hospital library, and a multi-type library network. She received a bachelor of arts degree in secondary education and a master of library science degree, both from the University of Pittsburgh.

Jennifer Reynolds, MPH, CHES, is section manager of health communication and marketing at Oak Ridge Associated Universities. Ms. Reynolds brings more than 10 years' experience managing projects for federal and state government and nonprofit organizations, specializing in health communication, formative research, building partnerships, and creating and promoting dynamic communication materials. Since 2015 Ms. Reynolds has supported the Appalachian Regional Commission (ARC) and the Centers for Disease Control

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and Prevention (CDC) National Center for Injury Prevention and Control to establish best practices for communicating about opioid misuse, abuse, and overdose. Her work has involved exhibiting and presenting at national conferences, developing and conducting in-person and virtual trainings for community antidrug coalitions, providing technical assistance to organizations as they develop and disseminate communication materials, and engaging stakeholders from 13 states and multiple sectors in the ARC region, including law enforcement, local government, health care, public health, pharmacy, and community coalitions.

Since 2010 Ms. Reynolds has served as project manager for the CDC Division of Cancer Prevention and Control's (DCPC) Bring Your Brave campaign, an effort to raise awareness of breast and ovarian cancer in young women among health care providers and populations at increased risk. In this role, Ms. Reynolds leads formative research to inform campaign strategy and has previously led development of the Know:BRCA online risk assessment tool. Ms. Reynolds has won numerous awards for her work on digital communication campaigns, including a Public Relations Society of America (PRSA) award of excellence (first place) and two Digital Health Award medals (gold and bronze). She has also been recognized for her workshop development, receiving a CDC Director's Recognition Award for "improving health care preparedness at the local level by creating interactive tools and designing dynamic workshops to coordinate various partners across the health care sector."

Daniel Sarpong, PhD, is the director of the Center for Minority Health and Health Disparities Research and Education, endowed chair of health disparities, and associate professor of biostatistics at Xavier University of Louisiana. The programmatic focus of Dr. Sarpong's research is in the areas of large epidemiological studies and lifestyle modification intervention trials designed to mitigate health disparities. The last 12 years of his research career have focused on translational research exploring innovative approaches to mitigating both biological and social determinants of health disparities in the areas of obesity and type 2 diabetes mellitus, cancer, and drug abuse and HIV/AIDS. Prior to returning to Xavier University of Louisiana, he was a research professor with the School of Health Sciences, senior biostatistician with Research Centers in Minority Institutions (RCMI) Translational Research Network Data Coordinating Center, and associate director with the Center of Environmental Health at Jackson State University. From 2000 to 2010, Dr. Sarpong served in various capacities and positions at the Jackson Heart Study (JHS), the largest single-site epidemiological investigation of the etiology and progression of cardiovascular disease in African-Americans. He was director of the JHS Coordinating Center (JHSCC); director of data management, quality assurance, and information technology; and coprincipal investigator and senior biostatistician of the JHSCC. Dr. Sarpong's research interests are in cardiovascular disease and health, HIV/AIDS, pharmacoeconomics and outcomes research, statistical and mathematical modeling, and health informatics.

Pamela Ramsey Staples, MS, is a public health program manager for the Tribal Health Program Support Department of the United South and Eastern Tribes, Inc. (USET) in Nashville, Tennessee. Ms. Staples has worked for USET for more than two years and has been instrumental in developing, implementing, and evaluating health programs and projects throughout Indian country. Ms. Staples has more than 20 years of experience in community and public health and is an experienced public speaker with extensive analytical, interpersonal, and problem-solving skills. Ms. Staples holds a master of science degree in community and public health from Middle Tennessee State University as well as numerous specialized training and certifications in health.

Rueben C. Warren, DDS, MPH, DrPH, MDiv, is director of the National Center for Bioethics in Research and Health Care at Tuskegee University. He serves as a professor at Tuskegee University and as an adjunct professor of public health, medicine, and ethics as well as director of the Institute for Faith-Health Leadership at the Interdenominational Theological Center in Atlanta, Georgia. From 2005 to 2007,

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he served part-time as the director of infrastructure development, National Institute on Minority Health and Health Disparities (NIMHD). From 1988 to 1997, Dr. Warren served as associate director for minority health at the Centers for Disease Control and Prevention (CDC). Prior to joining CDC, Dr. Warren served as an associate professor and dean of the School of Dentistry at Meharry Medical College.

Dr. Warren earned an undergraduate degree from San Francisco State University, a DDS degree from Meharry Medical College, and both master's and doctorate degrees from the Harvard School of Public Health. In June 1990, Dr. Warren received the Distinguished Harvard Alumni Award. Dr. Warren also completed a Master of Divinity degree from the Interdenominational Theological Center, and he is an ordained minister.

His extensive public health experience at community, state, local, national, and international levels ranges from leading clinical and research work at the Lagos University Teaching Hospital in Lagos, Nigeria, to heading the Public Health Dentistry Program at the Mississippi State Department of Health. Dr. Warren has contributed to the scientific literature in public health, oral health, ethics, and health services research. His professional associations include the Health Braintrust of the Congressional Black Caucus of the United States, National Dental Association, American Board of Dental Public Health, American Public Health Association, United Nations Children's Fund, and World Health Organization. From 1996 to 1997, he served as chairperson of the Caucus on Public Health and Faith Communities, an affiliate of the American Public Health Association.

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ENVIRONMENTAL HEALTH INFORMATION PARTNERSHIP

EnHIP PROJECTS 2017-2018

Benedict College, Columbia, South Carolina

Improving Minority-Serving Institutions' Knowledge of National Library of Medicine (NLM) Resources through Competitive Student Presentations

Student teams or individuals will research and present findings on environmental issues advanced by EnHIP. In addition, an intense student summer research internship for a small number of students will be offered. These combined projects support the EnHIP strategic plan and allow students to conduct both introductory and more advanced research by using the National Library of Medicine databases.

Charles R. Drew University of Medicine and Science, Los Angeles, California

Increasing Understanding of Our Environment to Improve Health Outcomes

The goal of this program is to provide environmental health and environmental justice information to promote health information literacy and reduce health disparities. The National Library of Medicine resources will be featured in training and information dissemination for students, faculty, and staff at King/Drew Medical Magnet High School and the Charles R. Drew University of Medicine and Science and with community organizations in the Service Planning Area 6. A symposium on research advances in environmental health and environmental justice as it relates to disease also is planned.

Colorado Mountain College, Glenwood Springs, Colorado

Immigrant Access to Environmental Health Resources and Career Training in Rural, Western Colorado

Fifteen immigrant women will take a home health course certifying them to be personal care attendants (PCAs). PCA training will include National Library of Medicine digital resources for consumers to promote healthier lifestyle choices and address environmental health issues and health disparities.

Medgar Evers College, City University of New York, Brooklyn, New York

Enhancing Education of Genomics, Genomic Healthcare and Medicine and Promoting Understanding of Precision Medicine in the Treatment of Cancer

The project will further develop and produce genomics health education information and activities. Program materials will be enhanced by incorporating information about precision medicine (i.e., the prevention and treatment strategies that consider individual human variation). The instructional materials and activities will utilize significant information resources available online from the National Library of Medicine and appropriate resources from the National Institutes of Health, such as the All of UsSM Research Program and National Cancer Institute.

Meharry Medical College, Nashville, Tennessee

Engaging Middle School Students in Citizen Science

The project will engage middle school students and their parents, teachers, librarians, environmental public health faculty, Meharry health professional students, public health officials, and Tennessee Department of Transportation officials in a coordinated effort to identify and map the best, safest routes that allow students to walk and bike to school and their public libraries in Nashville/Davidson County.

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Biking and walking promote wellness, and safety concerns will be addressed by citizen-government involvement.

The University of Texas at El Paso, El Paso, Texas

Access to the National Library of Medicine (NLM) Data to Improve Health Literacy about Opioids Use and Misuse

The project plan is to develop and pilot an awareness campaign, aimed at young adults aged 18–35, that depicts the natural history of opioid addiction. The campaign will take a Web-based approach designed to increase the number of at-risk youth who will use the NLM free, high-quality consumer information resources to learn about the natural history of opioid addiction and its consequences. Youth will be provided with information on how to recognize the signs of drug dependence.

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ENVIRONMENTAL HEALTH INFORMATION PARTNERSHIP DIRECTORY OF CURRENT REPRESENTATIVES 2017–2018

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